AGR-59

TALL FESCUE

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Tall fescue (*Festuca arundinacea* Schreb.) is the most important cool-season forage grass in Kentucky. Approximately 5.5 million acres are occupied by tall fescue in Kentucky. It is a versatile plant which can be used for animal feed, lawns and turf, and conservation purposes (grass waterways, rights-of-way, etc.).

Tall fescue is a deep-rooted, long-lived bunch grass with short rhizomes (underground stems). It is widely adapted and grows well on the state's many and varied soil types. Tall fescue produces a good sod which will support livestock during wet and rainy conditions.

Like other cool-season grasses, tall fescue produces the majority of its total growth during the first third of the growing season (Figure 1). Growth is slow during July and August, followed by increased production during autumn. Although the major share of fescue's total production normally occurs during the spring, autumn growth can be significant with proper fertility and split applications of nitrogen.

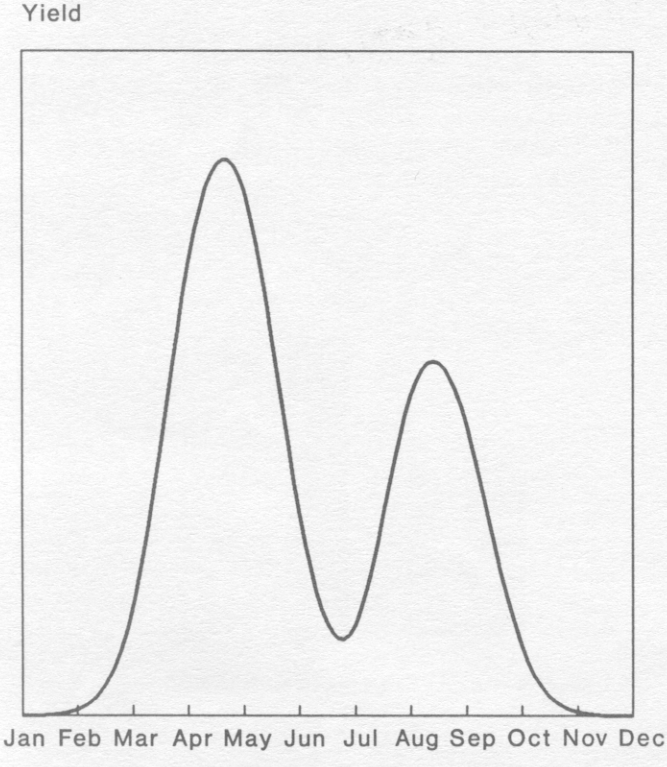

Figure 1. — Seasonal Yield Distribution of Kentucky 31 Tall Fescue (Spindletop Farm, Lexington, KY, 1988).

Total seasonal production of tall fescue is affected by weather, fertility (especially nitrogen), and cutting or grazing management. Yields of 2-4 tons of dry matter/acre are common, with the higher yields associated with proper fertilizer applications and harvest management.

Endophytic Fungus in Tall Fescue

Animal performance on tall fescue pasture has historically been inconsistent relative to other cool season grasses. The cause of this inconsistent performance has been attributed to an endophytic (endo = inside, phytic = the plant) fungus, *acremonium coenophialum,* thought to infect most Kentucky tall fescue in pastures. Endophyte-free tall fescue has been shown to provide better animal performance than endophyte-infected tall fescue (Tables 1 & 2).

Even though absence of the endophyte improves animal performance, elimination of the endophyte from tall fescue has recently been associated with decreased

Table 1. — Average daily gains and gains/ac of beef steers grazing endophyte-infected and endophyte-free Kentucky 31 tall fescue*

Endophyte Level	Avg Daily Gain	Animal Gain/Acre/Year
%	lb	
1	2.18	463
90	1.41	371

*Represents 3 year average.

(Data adapted from Pedersen et al., 1986. *Steer performance as affected by tall fescue cultivar and level of* Acremonium coenophialum *infection.* N.Z.J. Exp. Agric.)

Table 2. — Milk production and body weight change of dairy cows consuming endophyte-infected and endophyte-free Kentucky 31 tall fescue*

Endophyte Level	Milk Yield	Body Weight Change
%	lb/day	lb/month
0	43.0	17.2
63	34.0	-15.4

*Represents 2 year average.
(Data adapted from Strahan et al., 1987. *Performance of lactating dairy cows fed tall fescue forage.*)

seedling vigor (Figure 2). Even so, some new endophyte-free varieties have seedling vigor equal to or greater than endophtye-infected Kentucky 31. Decreased drought tolerance has also been associated with endophyte-free tall fescue in laboratory tests.

Replacing endophyte-infected tall fescue pastures with new endophyte-free varieties is an option that you should carefully consider, based on your management objectives. Even though endophyte-free tall fescue will produce more animal product per acre, it requires more intensive management. Endophyte-infected tall fescue pastures have historically withstood overstocking and continued grazing. However, endophyte-free tall fescue may not withstand close continued grazing, especially under stressful (drought) conditions, without the risk of stand damage.

If your management objectives include soil stabilization or maintaining livestock with little or no management inputs, then you probably should not replace your endophyte-infected pastures with endophyte-free tall fescue.

When you want maximum animal production per acre and can use careful grazing and production management, establishing endophyte-free tall fescue pastures is a better option. Despite recent reports of stand failures of endophyte-free tall fescue pastures, established, well-managed endophyte-free tall fescue pastures have been productive for years in many locations. For more information see Kentucky's Cooperative Extension publication, AGR-126, *Replacement of an Endophyte Infected Tall Fescue Stand,* AGR 119, *Alternatives for Fungus Infected Tall Fescue* and Oregon Tall Fescue Commission Publication, *The Fescue Endophyte Story.*

Varieties

Kentucky 31 was collected in 1931 on the mountain farm of W. M. Suiter in Menifee County, Ky. It was released in 1943 by UK's Agricultural Experiment Station and is still the most common tall fescue variety. Continued use of this single variety is due to its superior adaptability, good performance and the relative lack of other well adapted tall fescue varieties in the region.

This situation changed in the 1980s. Today, other good tall fescue varieties are available and more are anticipated in the near future. When you choose a variety, consider the following factors: seasonal distribution of yield, forage quality, disease resistance, seedling vigor, compatability with legumes and endophyte status. Table 3 describes several varieties. No matter what variety your choose, use high quality seed — preferably certified seed — to ensure maximum success in stand establishment.

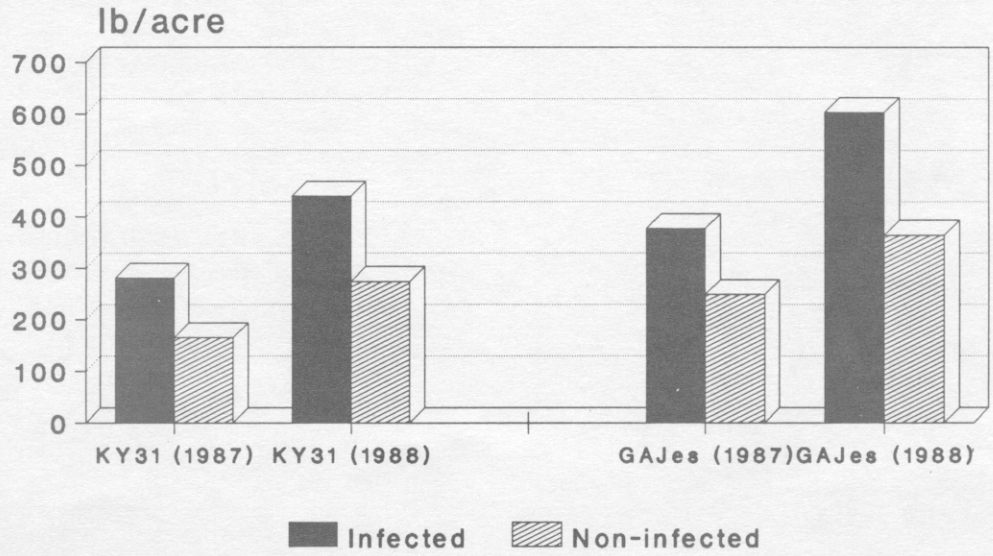

Figure 2. — *A. coenophialum*-Free vs *A. coenphialum*-Infected Kentucky 31 and Georgia Jesup Seedling Yields at 3 Months (Spindletop Farm, Lexington, KY).

Table 3. — Trails selected for during development of several tall fescue varieties

Variety	Year Released	Characteristics
Kentucky 31	1943	Good fall and winter growth, wide adaptability, persistent
Alta	1945	Like Kentucky 31, but 5 days earlier in maturity
Fawn	1964	High digestibility, high crude protein, high herbage yield, rust susceptible
Kenhy	1977	High vigor, soft lax leaves, high forage moisture during drought stress
Missouri 96	1977	High animal performance, soft fine texture
Forager	1980	High herbage yield, high vigor, good persistence
AU Triumph	1981	High yield in late winter or early spring
Johnstone	1983	Low perloline, high digestibility, improved succulence during summer
Martin	1985	High seed and herbage yield, high magnesium content
Mozark	1985	High seed and herbage yield, good animal performance
Safe	1985	High pasture quality, winterhardiness, improved

(Data adapted from Pedersen and Sleper, 1988. *Considerations in breeding endophyte-free tall fescue forage varieties.* J. Prod. Agric.)

Establishment

With adequate soil moisture, the best time to seed fescue is late summer and early fall. Spring seedings can be successful but are more susceptible to summer drought and weed competition. If you do seed in the spring, finish the seedings before mid-April.

- For pure stands, seed 15-20 lb of pure live seed in a prepared seedbed that has been limed and fertilized according to a soil test.
- When seeding in mixtures with legumes, reduce the fescue seeding rate by 1/3.
- When seeding in pure stands, apply nitrogen at 50 lb/A during seedbed preparation.

Many seeding methods, including no-till seeding, can be successful if they result in uniform distribution over the field, placement of seed below the soil surface (¼-½ inch deep) and firming the soil around the seed for close seed-soil contact. Good seedbed preparation and seed placement are especially important for establishing stands of endophyte-free varieties. For more information see Cooperative Extension Publication, AGR-64, *Establishing Forage Crops.*

Quality

Although endophyte infection in tall fescue has caused it to be viewed as a low quality forage, laboratory quality factors have shown good quality. Its digestibility compares favorably with orchardgrass and approaches that of perennial ryegrass (Table 4). When the endophyte is eliminated, tall fescue is a high quality forage in the laboratory and in the field.

Table 4. — Spring and fall digestibility of Kentucky 31 (endophyte-free) tall fescue, Hallmark orchardgrass and Ensilo perennial ryegrass

	Spring	Fall
	% IVDMD*	
Kentucky 31 Tall Fescue	58.1	56.2
Hallmark Orchardgrass	55.4	60.4

*IVDMD = In vitro dry matter disappearance, a measure of digestibility (Data adapted from Carlson and Umbaugh, 1988. *Strain tests of cool-season perennial forage grasses-1988,* Iowa State University)

Management of Established Pure Stands

Grazing — Management during spring is of vital importance for best quality and quantity, since tall fescue produces most of its total dry matter during this period.

A traditional management practice has been to use light stocking during spring to ensure a summer feed supply. However this practice results in much of the spring plant growth becoming too mature and being wasted, since cattle usually prefer not to eat overly mature plants and tramp a lot of them into the soil. Instead, spring growth can be more efficiently utilized if you restrict animals to small fields which can be kept grazed to a 3 to 4 inch height during April, May and June. This restriction may require temporary electric fences through large fields or it may just require closing gates to confine animals to small fields. Intake and quality will be higher when animals graze plants kept in a young, leafy stage of growth.

Since tall fescue grows slowly in July, August and September, animals need larger areas to graze during this period to avoid overgrazing. Having larger areas is especially important when endophyte-free varieties are used since they may not survive summer droughts as well if severely stressed by overgrazing. Ideally, a stubble height of 3 to 4 inches should be maintained throughout the summer. Fields not used for grazing during spring should be harvested as hay.

Hay — For highest yields of acceptable quality hay, make the first harvest when the plants' seed heads are in the boot to early heading stage of growth. Subsequent cuts should be made at 4 to 6 week intervals, depending on rainfall and growth. Early-cut hay will be leafier and more digestible, and it will be consumed in larger amounts than late-cut hay. The amount of forage consumed is important in determining animal productivity.

Fertilizers, especially nitrogen, are necessary for good fescue production. Figure 3 shows dry matter yields of tall fescue with different rates of nitrogen. Yields increased with each increase in rate of nitrogen. In these studies, half the nitrogen was applied in March and the rest in August.

Do soil testing periodically to monitor pH, phosphorus and potassium levels in the soil and to help you decide if lime and fertilizer topdressings are needed.

Stockpiling has increased in recent years. When you stockpile, you let August-November fescue growth accumulate in the field for deferred grazing during late fall and winter. The quality of stockpiled growth is high in late fall-early winter but declines as plants lose their green color.

The amount of growth during the stockpiling period depends on many factors, like moisture, temperature and fertility. Adequate nitrogen is important for maximum production during the stockpiling period and should be determined by the desired production level. Kentucky researchers have shown that fescue fertilized with 45 to 90 lb N/acre gave a yield increase of about 24 lb of dry matter for each pound of nitrogen when nitrogen was applied August 15 and yields were measured on December 1.

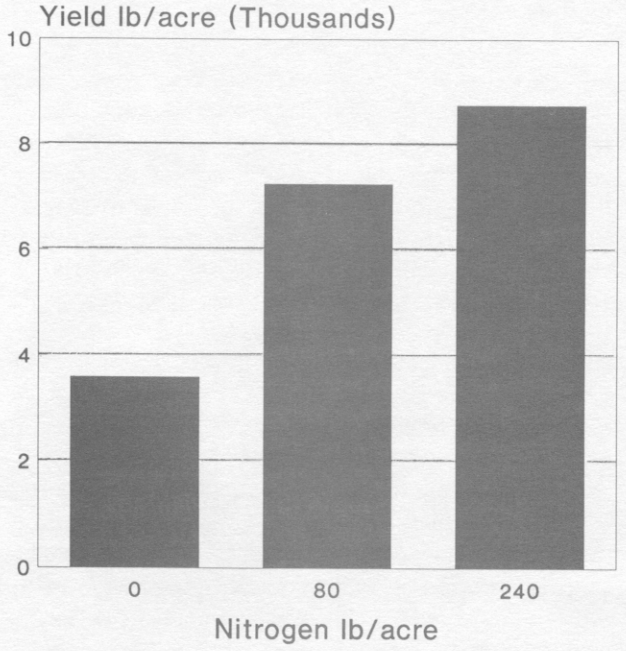

Figure 3. — Tall Fescue Dry Matter Yields at 3 Levels of N Fertilization (3 location avg., split application in Mar. and Aug. — K.L. Wells, University of Kentucky).

For best results in using stockpiled growth, use the restricted or strip grazing technique to avoid excessive loss.

Seed Production — Acres devoted to fescue seed harvest in Kentucky have drastically declined over the years. In the early 50s nearly 60,000 acres were harvested as certified seed. This acreage was reduced to 215 acres in 1988. Yields also decreased during this period from an average of 255 lb/A in 1971 to 200 lb/A in 1988. Acreage harvested as uncertified seed varies from year to year and with anticipated demand.

Two key management practices of vital importance in fescue seed production are: **(1)** clipping to remove excessive growth immediately after the seed crop is harvested and during the fall to promote tillering, and **(2)** applying nitrogen fertilizer during late fall or winter months.

For fescue seed production to be economical, it usually must be incorporated into a total forage-livestock operation. If desired, this system usually involves using part of the fescue acreage for seed harvest in spring, followed by stockpiling for fall and winter pasture. These two systems are quite compatible. The remaining fescue acreage is renovated with an adapted legume and used as pasture or hay during spring and summer.

Fescue-Legume Mixtures

Several legume species like clovers, trefoil, lespedeza or alfalfa can be grown in mixtures with tall fescue. Legumes usually improve summer production and total production over non nitrogen-fertilized tall fescue. Feed quality and animal performance are better on legume-fescue mixtures than on pure stands of tall fescue. Introducing legumes to endophyte-infected tall fescue pastures has also been shown to offset effects of fescue toxicity by reducing the amount of grass in the total diet. In addition to the above improvements, legumes also eliminate the need for applied nitrogen fertilizers since they are able to convert atmospheric nitrogen to a form which the plants can use.

Management decisions with fescue-legume mixtures should be made to benefit the legume component of the mixture to maintain the legumes in the stand as long as possible. For more information on managing legumes, see Cooperative Extension publications AGR-33, *Growing Red Clover in Kentucky,*

AGR-76, *Alfalfa-The Queen of Forage Crops,* AGR-93, *Growing White Clover in Kentucky* and AGR-86, *Growing Lespedeza in Kentucky.*

Applying lime, phosphorus and potassium help ensure legume persistence and yield. Base the application rates on a soil test.

Most legumes do not persist over extended periods in mixtures with cool-season grasses like tall fescue. When the legumes go out of the stand they may be reestablished in the fescue using pasture renovation techniques. For more information on renovation see Cooperative Extension publication AGR-26, *Renovating Grass Fields.*

Steps in Establishing and Managing a Tall Fescue Pasture Establishment

Establishment

(1) Select a variety based on management needs. No matter what variety you choose, use high quality seed — preferably certified seed.
(2) Test soil and lime and fertilize to recommendations. Apply nitrogen at 50 lb/acre before seeding for pure stands.
(3) Seed in late summer or early fall. Use 15-20 lb of pure live seed per acre and place seed ¼-½ inch deep maintaining good seed soil contact.
(4) Avoid excessive grazing of newly established endophyte-free tall fescue pastures in their establishment year.

Management

(1) Restrict cattle to small fields in the spring until they are grazed to 3-4 inches to ensure maximum utilization of the forage. Harvest ungrazed forage as hay.
(2) Allow cattle to range over larger areas in the summer and autumn to avoid overgrazing.
(3) Test soil periodically and fertilize accordingly to maintain fertility. Base nitrogen fertilization rates on management needs.
(4) Include legumes in the pasture to improve forage quality and productivity.
(5) Avoid overgrazing of endophyte-free tall fescue pastures, especially when approaching the hot, dry summer season.

About the Authors

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